To: Wetland Recovery Project Board of Governors

From: Science Advisory Panel

Date: September 8, 2003

Re: Annual Progress report on SAP Activities

At the October 2002 Wetlands Recovery Project (WRP) symposium, the Governing Board discussed and concurred with the Science Advisory Panel's (SAP) recommendations to:

- Develop a regional wetlands monitoring program
- Create decision support tools to prioritize regional wetland recovery

As part of this process, the SAP agreed to 1) continue securing funding and developing methodologies and tools to implement in the regional wetlands monitoring program (RWMP), and 2) further develop a detailed conceptual framework for the RWMP and to present this framework in a position paper. In addition, the SAP agreed to pursue the development of decision support tools by 1) continuing with the development and testing of the Southern California Riparian Ecosystem Assessment Method (SCREAM) and 2) work with the Managers Group to develop decision support tools that specifically aid selection of projects for the WRP Work Plan. This memo outlines the progress that has been made toward accomplishing these tasks. It also details additional activities that the SAP has undertaken since the September 2002 progress report on SAP activities.

Regional Wetland Monitoring Program (RWMP)

As currently envisioned, the long-term goal of SAP efforts in this area is to develop mapping, inventory, assessment tools, and programmatic infrastructure to institute long-term, region-wide monitoring program of southern California wetlands and associated resources. Conceptually, the RWMP ideally would include activities and coordination at three levels:

Level 1. Region-wide inventory and mapping to characterize wetland resource extent
Level 2. Assessment of resource condition with respect to recovery progress and response to anthropogenic stress
Level 3. Intensive monitoring and research at designated sites to better understand fundamental processes controlling wetland condition, response to stress, and wetland restoration processes.

The SAP has begun work on a position paper that will present detailed recommendations for the RWMP, including the management questions in which the RWMP will help to address. The SAP is also working to secure funding and develop data and methodologies that facilitate the implementation of Levels 1 and 2. Work on these initiatives is described in greater detail below.

Position Paper: Detailed Conceptual Framework for the RWMP

The SAP has begun work on a position paper that will provide detailed recommendations for the components of a RWMP. Work on this document began in June 2003 with a joint meeting with the Managers Group to define the management information needs that should drive a RWMP. Additional meetings are planned throughout the upcoming year, with a final draft anticipated in July 2004. A draft list of management questions that the RWMP would be designed to address is provided is attached to this report.

Funding and Interregional Coordination

The principal source of funding to implement monitoring-related activities is a $200K grant from the FY 2001 USEPA Section 104 (CWA) Program (Region 9) grant funds, with $50K in matching funds from the Coastal Conservancy. SAP staff was awarded an additional $200K from EPA from FY2002 grant funds. The EPA Office of Research and Development (ORD) is providing additional technical support through the Corvallis laboratory. Other funding, technical support and in-kind support are provided by a number of agencies and program mentioned specifically in each section.

EPA Region 9 is coordinating the development of regional monitoring programs for Southern California, Central Coast, and San Francisco Bay, with the intention that these regional programs will serve as a model for development of a statewide wetlands monitoring program. Through the past year, this interregional coordination has solidified through the establishment of a statewide Core Team, whose role is to develop standardized approaches and tools for inventory and assessment of California wetlands. SAP staff currently co-chairs the Core Team.

Level 1-- Inventory of Wetland and Riparian Resources

The goal of Level 1 activities is to develop a publicly accessible, GIS-compatible, relational database of maps and data sets that describe the physical and biological extent of wetland and riparian resources in southern California coastal watersheds from Point Conception to the California/Mexico border. Both present-day and historical resource data will be targeted.

Priorities for development of the inventory include 1) updating the mapping of estuarine and freshwater wetlands and 2) developing standardized approaches for mapping riparian resources in coastal watersheds. SAP staff has partnered with the State Resources Agency and the US FWS National Wetland Inventory program to update maps of all wetlands in the WRP project area. Currently, funding has been secured and mapping is underway for approximately 20% of the study area. Additional funding is being sought for the remaining quads. The SAP worked with the Core Team to develop a set of hydrogeomorphic (HGM) mapping codes that will be utilized by NWI in addition to the standard Cowardin classification in the Statewide Inventory. These HGM attributes will allow classification of the State's wetlands by hydrogeomorphic function and landscape position. This will aid in identifying and prioritizing wetland habitat types which have experienced the greatest impact. It will also aid the implementation of the California Rapid Assessment method (CRAM- see below) by providing a classification system compatible with this assessment method.

The SAP is utilizing grant funds from NOAA Coastal Services Center and USGS Gap Analysis Program (mentioned under decision support) to develop standardized methodologies for mapping and inventorying riparian resources. One anticipated product of this project is a GIS method that can be used to delineate riparian zone boundaries based on geomorphic features. When coupled with a map of riparian vegetation, this will provide a relatively cost-effective means of mapping riparian habitat on a regional or statewide basis. The Resources Agency, Legacy Program, and the Riparian Joint Venture staff are currently considering this approach to develop a statewide map of riparian habitat. The end product of the 1.5-year USGS-funded project will be maps of the riparian zone boundaries and vegetation for five southern California watersheds. These maps will be reviewed by WRP partner agencies and used as a template for expanding inventory efforts in southern California coastal watersheds. Currently, federal funding is also being sought to field test this methodology outside of southern California in other physiographic settings representative of California ecoregions.

Level 2 -- Assessment

Level 2 assessment activities are likely to include at minimum a regional survey to assess regional wetland condition and minimum standardized monitoring for WRP-funded restoration and enhancement projects. The SAP is continuing to work on a series of activities and collaborations to ensure that appropriate assessment tools are available for use in a RWMP. These include:

- **California Rapid Assessment Method (CRAM)** – The SAP, in collaboration with EPA Region 9 and partners in San Francisco Bay and the Central Coast, are working to develop a cost-effective, rapid assessment tool to estimate wetland condition. The California Rapid Assessment Method (CRAM) is intended to fill the existing gap in available methods by providing a rapid tool that can be used across a range of wetland classes and geographic regions. CRAM should provide a valuable tool to wetland managers for obtaining a "pulse" of the general condition of a wetland relative to a range of disturbances or stressors. CRAM is mainly intended for cost-effective ambient monitoring and assessment that can be performed on different scales, ranging from an individual wetland, to a watershed, or a larger region. Over time, wetland managers and scientists can develop a picture of reference condition for a particular wetland class or create a landscape-level profile of the condition of different wetlands within a region of interest. This information can then be used in planning wetland protection and restoration activities. Additional applications of CRAM could include: (1) preliminary assessments to determine the need for more traditional intensive analysis or monitoring, (2) providing supplemental information during the evaluation of wetland condition to aid in regulatory review under Section 401 and 404 of the Clean Water Act, the Coastal Zone Management Act, Section 1600 of the Fish and Game code, or local government wetland regulations, and (3) assisting in the monitoring and assessment of restoration or mitigation projects by providing a rapid means of checking progress along a particular restoration trajectory.

  Work on the CRAM in southern California began by forming a statewide Core team dedicated to the technical development of CRAM and intraregional coordination on

inventory and assessment. In February 2003, SAP staff hosted an EPA-sponsored workshop to introduce the concept of rapid assessment to WRP partner agencies. Since that time, the Core team has been working to develop the CRAM attributes and metrics, and have recently completed work on Version 1.6.1. Additional steps in CRAM development include 1) verification, 2) calibration, and 3) validation. SAP staff and other CRAM co-principal investigators from other regions will begin the process verifying that CRAM captures wetland condition along a stressor gradient. Calibration of CRAM will begin in 2004, with a provisional version ready for field deployment in early 2005.

- **EPA Environmental Assessment and Monitoring Program (EMAP) –** One component of a RWMP is likely to be a regional survey. Attributes of this survey would include a random selection or sub-sample of sites by wetland sub-class to statistically estimate wetland condition on a regional basis. The SAP is developing experience in EMAP regional survey methodology (including statistical sampling design, data management, QA/QC procedures, etc.) by coordinating the 2002 assessment of estuarine wetlands in southern California. This assessment program sampled a total of 90 sites in California and another 90 in Oregon and Washington. While EMAP assessments traditionally focus on contaminants, SAP involvement in the project led to the piloting of additional field and GIS indicators that may be appropriate and cost-effective means of assessing wetland condition in a regional survey. The results of this assessment will provide a preliminary basis for assessing the cost/benefits of indicator selection and sampling design in designing the WRP's RWMP.

Decision Support Tools

In our June 2002 position paper, the SAP recommended that the WRP develop decision support tools to help prioritize the funding of preservation and restoration activities based on the ecological criteria outlined in the quantifiable recovery objectives. Requests from some Governing Board members that the Managers Group clarify how projects are selected for the Work Plan also underscore the need for clarity in the project selection criteria. SAP staff has pursued the development of decision support tools by 1) continuing with the development and testing of the Southern California Riparian Ecosystem Assessment Method (SCREAM) and 2) working with the Managers Group to develop a checklist of ecological criteria that will specifically aid selection of projects for the WRP Work Plan.

Southern California Riparian Ecosystem Assessment Method (SCREAM)

In the process of exploring decision support tools to prioritize recovery of riparian areas, the SAP began work with the NOAA Coastal Services Center (CSC) in July 2001 to develop a GIS-based tool to assess the ecological integrity of riparian resources on a landscape scale. The conceptual approach of this tool is based on the Spatial Wetlands Assessment for Management and Planning (SWAMP) model, a NOAA CSC product used to examine the ecological significance of a wetland to its watershed by assessing contributions it makes to habitat support, water quality, and hydrology. The SAP envisions that the SCREAM tool will aid in:

- Strengthening long-term regional planning of recovery activities by pro-actively targeting riparian areas with a high functional contribution to the watershed for preservation and restoration.
- Improving the annual WRP project selection process by evaluating proposals from the perspective of how a project's selection will contribute to recovery on a landscape scale.
- Developing priorities for preservation and restoration within a watershed.
- Evaluating regional condition of riparian habitat.

As currently conceived, the long-term goal of this project would be to incorporate the landscape assessment indicators into a user-friendly, GIS-based decision support tool. Features of this tool will allow the user to integrate the results of the landscape assessment of ecological function, along with other GIS data layers such as public land ownership, city and county zoning maps (indicative of planned future growth), local conservation planning, etc. to aid in prioritizing recovery efforts.

The implementation plan for the 1.5 year pilot project calls for 1) development of the methodology of the landscape assessment, 2) compilation of existing data, 3) identifying and addressing major data gaps, and 4) testing and evaluating assessment on five southern California coastal watersheds. During the past year, SAP staff has worked with NOAA CSC staff to refine the metrics of the SCREAM model, compile data from 5 pilot watersheds, and develop the computer programming code for the model. WRP Task Force watershed coordinators, funded through a Prop. 13 grant from the State Water Resources Control Board, provided support by compiling existing data needed for the landscape assessment. Preliminary results of the habitat component of the SCREAM model are anticipated in fall 2003, while results from the biogeochemistry and hydrology components should be available in summer 2004.

In fall 2004, the SAP, WMG and Task Forces will 1) evaluate how best to incorporate the tool into regional recovery planning by the WRP and its partners; and 2) determine the data, funding, and staff resources needed to complete the next phase of the project. The WMG and SAP will also evaluate the utility of expanding the model to assess additional factors that influence WRP priorities such as feasibility and socioeconomic considerations.

Checklist of Ecological Criteria for WRP Project Selection

The SAP held a joint meeting in June 2003 with the Managers Group to develop a checklist of checklist of ecological criteria to consider for WRP project selection. This meeting resulted in a list of ecological criteria specifically targeting the acquisition, restoration or enhancement of riparian areas in the WRP project areas. The SAP anticipates that this list will be utilized in the selection of projects on the 2004 Work Plan.

Water Quality as Primary Goal of the Wetland Recovery Project

There was a request by some Governing Board members at the October 2003 meeting that the SAP address the question of whether " improving water quality" should be elevated on equal footing with habitat recovery as a primary goal of the Wetland Recovery Project. The SAP discussed this issue at their April 2003 meeting and issued the following statement:

The ability of wetlands to enhance water quality is a recognized value of these ecosystems. For this reason, the use of treatment wetlands to improve the quality of urban, agricultural or other types of nonpoint source effluent is gaining popularity in southern California. It is important to note, however, that not all wetlands perform this service to the same degree. The degree to which wetlands and riparian areas function to improve water quality varies based on the specific features of the wetland and the landscape position of the wetland. For most wetland types, we do not fully understand the degree to which they improve water quality and all the factors that influence their ability to enhance water quality. To improve our understanding of the role of various wetland types in water quality enhancement, the Science Advisory Panel recommends that the WRP adopt a goal of improving the status of our knowledge about the role of wetlands in water quality enhancement by supporting research and monitoring of water quality and habitat features at preserved, restored, and constructed wetland and riparian sites. Until our understanding of this issue increases, the primary goal of the WRP should remain to preserve and enhance wetlands and riparian areas for their habitat goals, with improvement of water quality being an important, but secondary goal.

Management Questions to be Addressed by Regional Wetlands Monitoring Program: Suggestions from WRP Managers Group

At the October 2003 WRP Governing Board meeting, the Science Advisory Panel (SAP) agreed to develop detailed recommendations for a regional wetlands monitoring program (RWMP). These recommendations will be presented in a position paper that will provide detail on the technical elements as well as the programmatic infrastructure required for implementation of the RWMP.

A monitoring and assessment program can only be considered effective if it provides addresses the information needs of its client agencies. Therefore, the first step in developing a RWMP is to identify the information needs and management issues, hereto referred to as management questions, of the WRP partner agencies and organizations. The SAP held a joint meeting on June 18, 2003 with members of the WRP Managers Group and County Task Forces to develop a preliminary list of management questions. The SAP will consider this list in formulating a set of assessment questions (i.e. what should be monitored to answer the management questions) that will drive the technical elements of the RWMP. This document summarizes the general comments WRP Managers Group and County Task Force members regarding the RWMP and the list of management questions suggested by the group. The management questions listed below apply to all wetland classes unless specified. *Note that this is a preliminary list that will be reviewed by the Managers Group and SAP at subsequent meetings.*

General Comments on RWMP

Project-Specific Monitoring

- Monitoring should address the performance standards set by project goals
- Monitoring should look at the surrounding wetlands and upland area, not just the project site.
- Monitoring should not be a one-time proposition- the sustainability of the project needs to be demonstrated. This should also include public projects.
- Need to establish some regional benchmarks to evaluate the success of projects

General

- Need to identify suitable reference sites
- Establishing trends over time is important (e.g. size, number, function, etc.)
- Evaluation of impact of projects on water quality should be done on a watershed-wide basis.

Management Questions

General

- Where are the wetlands?
- What is the acreage of wetlands and is the acreage increasing?
- What is the distribution of habitat types by wetland class?
- What is the extent of type conversion in wetlands?

- What is the condition of southern California wetlands, and how is this condition changing over time?

Landscape Processes
- To what extent are southern California wetlands fragmented?
- What is the ecological connectivity among habitat patches?
- How does land use change in the watershed affect wetlands?
- What are the effects of natural climatic variability (e.g. El Nino events) on wetlands?

Hydrology
- What is the condition of estuarine or lagoon mouths or tidal inlets?
- In which estuaries or lagoons is the tidal circulation poor, adequate or good?
- What are the effects of augmented or diverted freshwater input to estuarine or lagoon ecosystem (timing, quantity, salinity regime)? In which wetlands are alterations in freshwater input significant?
- What is the extent of alteration of flow regime in wetlands?
- To what extent have peak flows been altered in riverine wetlands?

Physical Structure and Sediment Processes
- What percentage of riverine wetlands have a connection to the floodplain? What is the integrity of the floodplain with respect to surrounding land use, opportunities for connection/reconnection, and barriers affecting flood flows
- What percentage of wetlands have problems with erosion, excessive sedimentation or scouring?
- What percentage of riverine wetlands are channelized, are entrenched, have flow constrictions or engineered structures?
- What is the impact of altered sedimentation patterns on wetlands? How many wetlands are impacted?

Water Quality and Contaminants
- How effective are different wetland classes in improving water quality?
- What are the concentrations of contaminants in wetlands?
- What is the impact of excessive nutrients and/or algal growth on wetland plant and animal communities?
- What are the patterns of change in concentration of contaminants along common food chains involving native wetland plants and animals?
- Which contaminants are bioaccumulating to levels of concern in wetland organisms?

Vegetation
- What are the distribution, species composition, and abundance of native plant communities?
- What impacts are invasive plants having on native plant and animal communities? What is the distribution of these invasive plant in wetlands

Invertebrates, Amphibians, Reptiles, Mammals, Birds, and Fish

- What are the distribution, species composition, and abundance of native animal communities?
- What are the distribution and abundance of special status species?
- What are the distribution and abundance of invertebrates or other fauna that serve as prey items for birds and fish?
- What are the relationships between bird populations (e.g. California Least Tern) and availability of fish in wetland areas?
- What impact are invasive animals having on native plant and animal communities? What is the distribution and abundance of invasive animals species in wetlands.
- What are the regional population trends in birds and fish (wetland dependent species, rare and endangered populations)?
- Where are the barriers to fish passage?

Miscellaneous

- What is the extent of human recreation in southern California wetlands? What impact is this recreation having on wetland condition?
- To what extent is trash in wetlands a problem? What is the impact of this trash?
- How has urbanization of watersheds affected wetland condition?